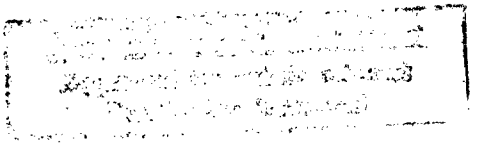
FINAL REPORT
AUGUST 1997

REPORT NO. 97-31

BULK CS OVERPACK SALVAGE DRUMS UNITED NATIONS (UN) PERFORMANCE ORIENTED PACKAGING (POP) TESTS



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1. Enclosed are two pages for the U.S. Army Defense Ammunition Center (DAC) Report No. 97-31.

2. Remove and insert pages 4-2 and 4-4.

2. The POC for Report No. 97-31 is Mr. Ejike J. Ajalla, SIOAC-DEV, DSN 585-8336, commercial (815) 273-8336.

FOR THE DIRECTOR:

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JEROME H. KROHN
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SIOAC-DEV (702-3b)
Subject: M118 Demolition Charge in Wirebound Wooden Box UN POP Test

REPORT DOCUMENTATION PAGE

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17. COSATI CODES			18. SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT *(Continue on reverse if necessary and identify by block number)*

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV), was tasked by U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct United Nations (UN) Performance Oriented Packaging (POP) tests on bulk CS salvage drums. UN POP tests were conducted to determine if these salvage drums were suitable to be used for shipment of bulk CS to Pine Bluff Arsenal (PBA) for demilitarization. The salvage drums used for shipment of bulk CS met all UN POP, Packing Group II, test requirements.

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U.S. ARMY DEFENSE AMMUNITION CENTER
VALIDATION ENGINEERING DIVISION
SAVANNA, IL 61074-9639

REPORT NO. 97-31

BULK CS OVERPACK SALVAGE DRUMS UNITED NATIONS (UN) PERFORMANCE ORIENTED PACKAGING (POP) TESTS

TABLE OF CONTENTS

PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV), was tasked by U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct United Nations (UN) Performance Oriented Packaging (POP) tests on bulk CS salvage drums. UN POP tests were conducted to determine if these salvage drums were suitable to be used for shipment of bulk CS to Pine Bluff Arsenal (PBA) for demilitarization.

B. AUTHORITY. This program was conducted IAW mission responsibilities delegated by the U.S. Army Material Command (AMC), Logistics Support Activity Packaging, Storage, and Containerization Center (LOGSAPSCC). Effective 9 July 1993, the three-letter designator "DEV" was assigned for use when conducting UN POP tests. Effective 9 August 1994, this designation was included in the Joint Regulation AR 700-143, Performance Oriented Packaging of Hazardous Materials.

C. OBJECTIVE. The objective of these tests was to determine if these salvage drums could meet UN POP, Packing Group II, requirements.

D. CONCLUSION. The salvage drums met UN POP, Packing Group II, requirements for shipment of bulk CS.

PART 2

AUGUST 1997

ATTENDEES

Ejike J. Ajalla
Mechanical Engineer
DSN 585-8434
815/273-8434

Director
U.S. Army Defense Ammunition Center
ATTN: SIOAC-DEV
3700 Army Depot Road
Savanna, IL 61074-9639

PART 3

TEST PROCEDURES

The test procedures outlined herein were extracted and summarized from the Bureau of Explosives (BOE) Tariff No. BOE-6000-L, Subpart M, Section 178.600. All tests were conducted to Packing Group II requirements.

A. DROP TEST. Each package will be dropped onto a nonyielding surface from the height and orientations listed below. The drop height is measured as the vertical distance from the target to the lowest point on the package. The drop height for Packing Group I is 1.8 meters (5.9 feet), for Packing Group II it is 1.2 meters (3.9 feet), and Packing Group III is 0.8 meters (2.6 feet).

Packaging	No. of tests	Drop orientation of samples
Steel drums, Aluminum drums, Metal drums (other than steel or aluminum), Steel jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and jerricans, Composite packagings which are in the shape of a drum.	Six—(three for each drop) ...	First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on the circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.
Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are n the shape of a box.	Five—(one for each drop) ...	First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample).
Bags—single-ply with a side seam.	Three—(three drops per bag).	First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).
Bags-single-ply without a side seam, or multi-ply.	Three—(three drops per bag).	First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples).

B. STACKING TEST. The test sample must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport. The minimum height of the stack, including the test sample, must be 3.0 meters (10 feet). The duration of the test must be 24 hours, except that plastic drums, jerricans, and composite packaging 6HH, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 degrees Celsius (104 degrees Fahrenheit). Alternative test methods which yield equivalent results may be used if approved by the Associate Administrator for Hazardous Materials Safety.

C. VIBRATION TEST. Three sample packagings, selected at random, must be filled and closed as for shipment. The three samples must be placed on a vibrating platform that has a vertical or rotary double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate. The test must be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material approximately 1.6 mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

D. PASS/FAIL CRITERIA. A package passes the above tests if there is no rupture or leakage from any of the samples. No test sample should show any deformation which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

PART 4

UN POP TESTS

Bulk CS Overpack Salvage Drums

U.S. Army Defense Ammunition Center

SIOAC-DEV, Savanna, IL 61074-9639

815/273-8908

Jerome H. Krohn

Test Report No. 97-31

Service Code: None

Product NSN: 1365-00-690-8655/
1365-00-143-6880

Nomenclature: Riot Control, CS

Shipping Name: Toxic Solid, Organic,
N.O.S. (O-Chlorobenzylidene
Malononitrile) UN 2811

Hazard Class: Poison 6.1

Packing Group: II

Physical State: Solid

NALC/DODAC: K935/K772

CAA No: N/A

EX No.: None

CFR 49 Packaging Method: 173.21

Net Explosive Weight: None

DESCRIPTION OF PACKAGINGS TO BE TESTED

EXTERIOR CONTAINER

Exterior Container: Overpack Steel Drum

CFR 49 Reference Number: 172.101, 173.211

UN Code: N/A

NSN Exterior Container: N/A

Specifications: UN 1A2 Steel Salvage Drum

Net Quantity Weight: 36.4 kg (80.0 pounds)

Tested Gross Weight: 118.2 kg (250.0 pounds)

Exterior Dimensions: H-38-1/2" X D-27"

Manufacturer: Unknown

Year Container Manufactured: Unknown

Drawing Number(s): N/A

Cushioning: Vermiculite filler (MIL-V-21826) around intermediate container as required for a tight pack

Closure: Metal chime with bolt

INTERMEDIATE CONTAINER

Intermediate Container: Steel Drum

CFR 49 Reference Number: 172.101,173.211

UN Code: N/A

NSN Interior Container: N/A

Specification: DOT5B, 6C or Equal

Net Quantity Weight: 36.4 kg (80 lbs)

Dimension Exterior: H-34-3/8" X D-24"

Manufacturer: Unknown

Year Container Manufactured: Unknown

Drawing Number(s): N/A

Cushioning: Fiberboard pads (ASTM-D 4727) as required for a tight pack.

Closure: Metal chime with bolt

UNIT CONTAINER

Unit Container Description: Vapor Barrier Bag

Unit Container specification: MIL-B-131

Unit Container NSN: N/A

Unit Container Cushioning: N/A

Unit Container Closure Method: Heat Seal

Unit Container Dimensions: L-24" X W-16"

Unit Weight: 3.64 kg (8 lbs)

Number of Unit Containers: 10

Unit Container Overpack: Cotton cloth bag

Unit Container Overpack Dimensions: L-25" X W-17-1/2"

Unit Container Overpack Closure Method: Stitching

Unit Container Overpack Specification: UU-S-48

SPECIAL NOTE

All exterior and intermediate containers must be inspected prior to use. Inspect for physical damage and structural integrity of the containers. Make sure lid fits snuggly and bolt tightly secured.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes: Military or DoD licensed truck.

Specific Gravity: N/A

Hydrostatic Test Pressure Applied: N/A

Leakproofness Test Pressure Applied: N/A

TEST PROCEDURES

Tests Conducted	Test Method	Test Results
(1) Pre-Conditioning (fiberboard)	Part 178.602	N/A
(2) Drop Test	Part 178.603(e)(1)(ii)	Pass
(3) Leakproofness Test	Part 178.604	N/A
(4) Hydrostatic Pressure Test	Part 178.605	N/A
(5) Stacking Test (1,500 lbs)	Part 178.606©(1)	Pass
(6) Vibration Test	Part 178.608(b)(3)	Pass

POP Marking

u 1A2/Y118.2/S**

n USA/DOD/AYA

CERTIFICATION

Unless expressly stated to the contrary, we certify that all of the above applicable tests have been performed in strict conformance to CFR 49, Subpart M, Parts 178.600 – 178.608. Based on the successful test results shown above, this container is deemed suitable for transport of the hazardous material described herein, provided that maximum tested weights and quantities are not exceeded and the packaging is assembled as tested. The use of other packaging methods or components may make this test invalid.

PREPARED BY: Ejike Joe Ajalla DATE: 6 October 1998

EJIKE J. AJALLA

Test Engineer

SUBMITTED BY: Jerome H Krohn DATE: 7 Aug '98

JEROME H. KROHN

Chief, Validation Engineering Division

SUBMITTED BY: William F Ernst DATE: 7AUG98

WILLIAM F. ERNST

Chief, Logistics Engineering Office

PART 5

TEST EQUIPMENT

A. COMPRESSION TESTER.

1. Manufacturer:	Ormond Manufacturing
2. Platform:	60- by 60-inches
3. Compression Limit:	50,000 pounds
4. Tension Limit:	50,000 pounds

B. TRANSPORTATION SIMULATOR.

1. Manufacturer:	Gaynes Laboratory
2. Capacity:	6,000-pound pallet
3. Displacement:	1/2-inch amplitude
4. Speed:	50 to 400 rpm
5. Platform:	5- by 8-foot

C. SCALE.

1. Manufacturer:	Fairbanks Scales
2. Model:	H90-5200
3. Platform:	6- by 8-foot
4. Capacity:	10,000 pounds

PART 6

UN POP TEST RESULTS

The steel salvage drum was filled to a total weight of 250 pounds. The container was secured with a metal chime fastened with a bolt to ensure the container remained closed. The container successfully passed 24 hours of compression testing at 1,500 pounds with no damage occurring. The same container successfully completed three orientations of 1-hour vibration testing. The container also completed three drops at a 45 degree angle to the chime and three drops on its side on the weld seam from a height of 3.9 feet with only minor damage occurring at the side of the drum.

PART 7

SPECIAL PACKAGING INSTRUCTIONS (SPI)

SPECIAL PACKAGING INSTRUCTIONS (AMCCOM Suppl 1 to AR 700-15)	1. NATIONAL STOCK NUMBER NA

2. SPI NO	3. REVISION	4. DATE
(AD) P 1365 DEMIL/CS-1		19 SEPTEMBER 97

5. PART OR DRAWING NO	6. FSCM	7. MIL-P-116 CLEANING/DRYING
N/A	59578	

8. QUP/UNIT OF ISSUE	9. ICQ	10. UNIT PACK WEIGHT (APPROX LB)	11. UNIT PACK CUBE (EXT) (APPROX FT)	12. UNIT PACK SIZE (EXT) (APPROX FT)
8 / lb	---	255	12.000	26" DIA. X 37" HIGH

13. LEVEL A UNIT PACK REQUIREMENTS

MIL-P-116 METHOD ____	STEPS	DRAWING OR SPECIFICATION	STYLE	TYPE	GRADE	CLASS	SIZE (INSIDE DIMENSIONS IN INCHES) AND REMARKS
BAG, VAPOR BARRIER	1	MIL B 131 OR EQUAL					16"X 24"
BAG, COTTON CLOTH	2	UU-S 48 OR EQUAL					17-1/2" X 25"
THREAD COTTON	3	UU-S 48					MEDIUM/COURSE
PAD, FIBERBOARD	4	ASTM-D 4727					22"DIA. X 1/8"T
CONTAINER, DRUM, STEEL	5	DOT 5B, 6C OR EQUAL					22-1/2"Dia. x 34-3/8"H
FILLER, VERMICULITE	6	MIL-V 21826 OR EQUAL					AS REQD.
OVERPACK, DRUM, STEEL	7	UN 1A2 STEEL SALVAGE DRUM					27' DIA. X 38 1/2" HIGH

14a. LEVEL B: METHOD ____ [X] NOT APPLICABLE [ ] SEE NOTE ____

14b. LEVEL C: METHOD ____ [X] NOT APPLICABLE [ ] SEE NOTE ____

15. INTERMEDIATE PACKAGING AND PACKING WILL BE IN ACCORDANCE WITH SPECIFICATION MIL-STD-2073-1 OR AS OTHERWISE SPECIFIED HEREON.

16. MARKING WILL BE IN ACCORDANCE WITH MIL-STD-129.

17. SPECIFICATIONS, STANDARDS, AND DRAWINGS LISTED HEREON OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID FORM A PART OF THIS DATA SHEET. THE APPLICABLE GENERAL AND REFERENCED REQUIREMENTS OF SPECIFICATION MIL-STD-2073-1 FORM PART OF THIS DATA SHEET. UNLESS OTHERWISE SPECIFIED, MATERIALS WILL BE MINIMUM SIZE IAW MIL-STD-2073-1.

18. TOLERANCES SHALL BE IN ACCORDANCE WITH MATERIAL SPECIFICATIONS. QUALITY PERFORMANCE AND TESTING REQUIREMENTS SHALL BE IN CONFORMANCE WITH MIL-P-116 OR AS OTHERWISE SPECIFIED HEREON.

19. NOTES/DRAWINGS

(A) THIS DOCUMENT CONTAINS PACKAGING INSTRUCTIONS FOR THE PREPARATION OF CS (ANY TYPE) PACKED IN (8 LB) BAGS OR PLASTIC BOTTLES IN STEEL DRUMS AND OVERPACKED IN STEEL DRUMS FOR SHIPMENT TO A DEMILITARIZATION SITE.. CONTAINER MUST NOT TO EXCEED 260 LBS. (MAX) GROSS WEIGHT.

(B) PACKAGING: PACK 8 LBS (+/- 2 OZ.)IN BARRIER BAG AND HEAT SEAL TO CLOSE. OVERPACK IN A TIGHT FITTING CLOTH BAG AND STICH W/COTTON THREAD TO CLOSE (DO NOT DAMAGE BARRIER BAG DURING SEWING. PLACE TEN BAGS IN TO A STEEL DRU IN LAYERS OF 5 BAGS EACH AND INSERT A FIBERBARD PAD BETWEEN LAYERS. CLOSE LID AND SEAL. PLACE STEEL DRUM INTO AN OVERPACK STEEL SALVAGE DRUM, FILL VOID BETWEEN DRUMS W/ VERMICULITE, CLOSE DRUM LID AND SEAL.

(C) MARKING: MARK LID OF SALVAGE DRUM W/ UN PROPER SHIPPING NAME, UN SERIAL NUMBER AND HAZARD LABEL AND FRONT OF SALVAGE DRUM W/ PROPER SHIPPING NAME, NSN, QTY/NOMINCLATURE, GROSS WEIGHT AND DRAWING NO. (SPECIAL PACKAGING INSTRUCTION [SPI]).

PROPER SHIPPING NAME IS: "TOXIC SOLID, ORGANIC, N.O.S. (O-CHLOROBENZYLIDENE MALONONITRILE) UN 2811"

PERFORMANCE ORIENTED PACKAGING (POP) IS: u 1A2/Y118.2/S/** ** = LAST TWO DIGITS OF YEAR PACKED.
n USA/DOD/AYA

20. ITEM IDENTIFICATIONS CODE(S)	21. ITEM SIZE	22. ITEM WT	23. APPROVED
			Donald G. Pashouk

24. NOMENCLATURE CS DRUMS FOR DEMIL

25. PAGE 1 OF 2 PAGES

PART 8

PHOTOGRAPHS

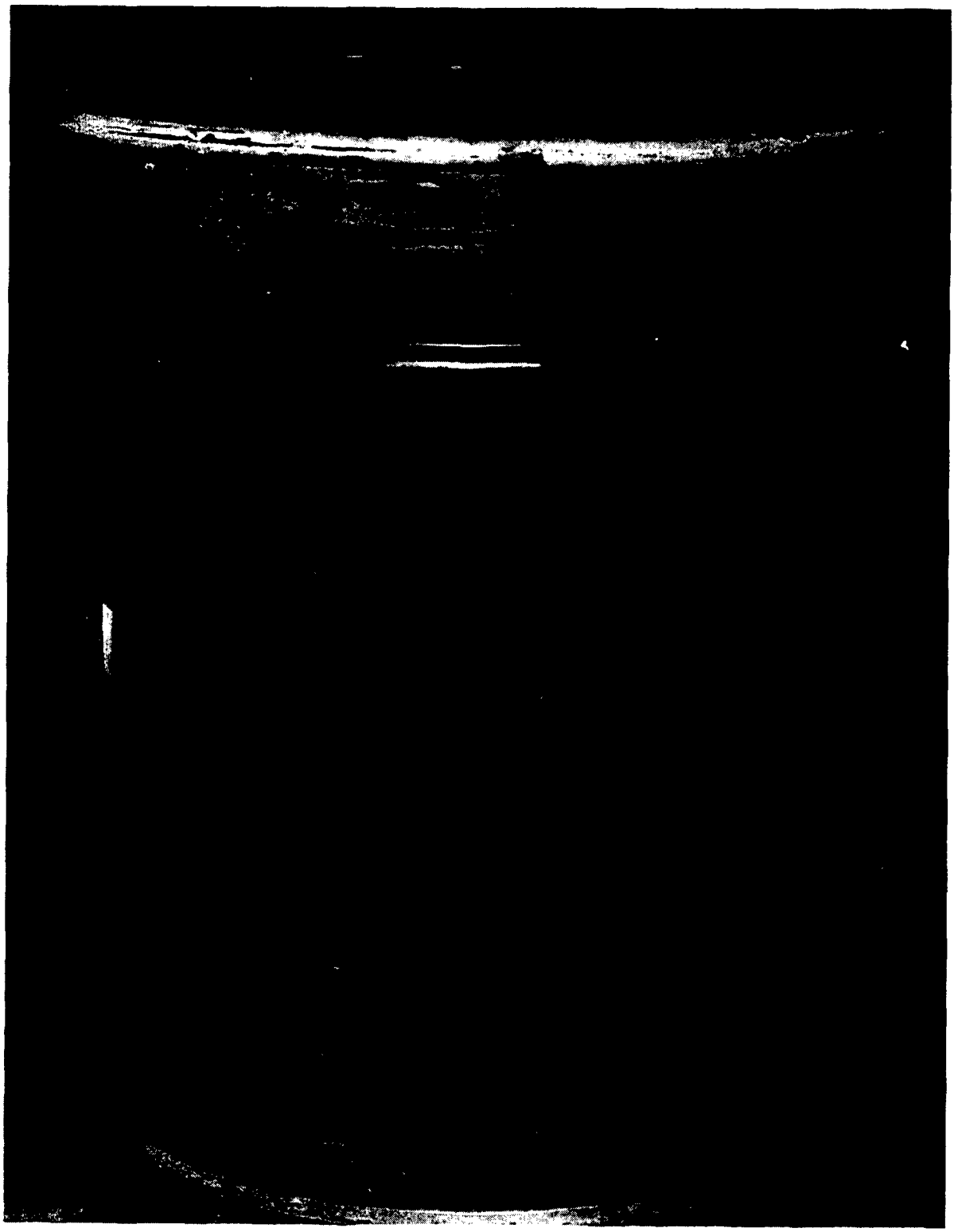

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PHOTO NO. AO317-SCN-97-3603. This photo shows a close-up view of the salvage drum before testing.		

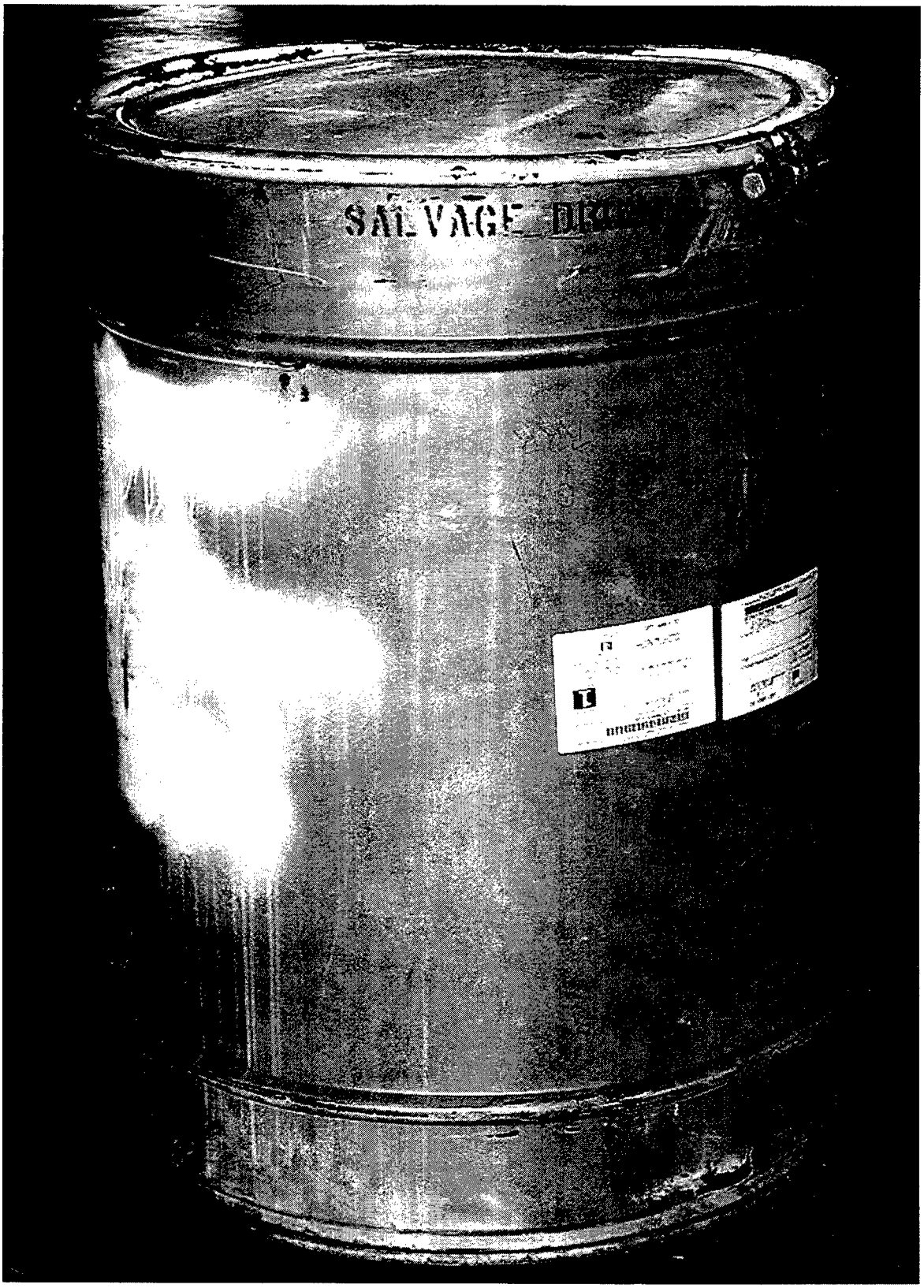

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PHOTO NO. AO317-SCN-97-DEVJOPO1.TIF. This photo shows a close-up view of the salvage drum after the drop tests.		